Fishery Management Report 17-58

2018 Report to the Alaska Board of Fisheries: Southeast Alaska–Yakutat Herring Fisheries

by

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Alaska Department of Fish and Game **Divisions of Sport Fish and Commercial Fisheries**

Symbols and Abbreviations

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Weights and measures (metric)

centimeter	cm
deciliter	dL
gram	g
hectare	ha
kilogram	kg
kilometer	km
liter	L
meter	m
milliliter	mL
millimeter	mm

Weights and measures (English)

cubic feet per second	ft^3/s
foot	ft
gallon	gal
inch	in
mile	mi
nautical mile	nmi
ounce	oz
pound	lb
quart	qt
yard	yd

Time and temperature

day	d
degrees Celsius	°C
degrees Fahrenheit	°F
degrees kelvin	K
hour	h
minute	min
second	s

Physics and chemistry

all atomic symbols	
alternating current	AC
ampere	A
calorie	cal
direct current	DC
hertz	Hz
horsepower	hp
hydrogen ion activity (negative log of)	pH
parts per million	ppm
parts per thousand	ppt, ‰
volts	V
watts	W

General

Alaska Administrative Code	AAC
all commonly accepted abbreviations	e.g., Mr., Mrs., AM, PM, etc.
all commonly accepted professional titles	e.g., Dr., Ph.D., R.N., etc.
at	@
compass directions:	
east	E
north	N
south	S
west	W
copyright	©
corporate suffixes:	
Company	Co.
Corporation	Corp.
Incorporated	Inc.
Limited	Ltd.
District of Columbia	D.C.
et alii (and others)	et al.
et cetera (and so forth)	etc.
exempli gratia (for example)	e.g.
Federal Information Code	FIC
id est (that is)	i.e.
latitude or longitude	lat or long
monetary symbols (U.S.)	$, ¢
months (tables and figures): first three letters	Jan,...,Dec
registered trademark	®
trademark	™
United States (adjective)	U.S.
United States of America (noun)	USA
U.S.C.	United States Code
U.S. state	use two-letter abbreviations (e.g., AK, WA)

Mathematics, statistics

all standard mathematical signs, symbols and abbreviations	
alternate hypothesis	H_A
base of natural logarithm	*e*
catch per unit effort	CPUE
coefficient of variation	CV
common test statistics	(F, t, χ^2, etc.)
confidence interval	CI
correlation coefficient (multiple)	R
correlation coefficient (simple)	r
covariance	cov
degree (angular)	°
degrees of freedom	df
expected value	*E*
greater than	>
greater than or equal to	≥
harvest per unit effort	HPUE
less than	<
less than or equal to	≤
logarithm (natural)	ln
logarithm (base 10)	log
logarithm (specify base)	$\log_2$, etc.
minute (angular)	'
not significant	NS
null hypothesis	H_O
percent	%
probability	P
probability of a type I error (rejection of the null hypothesis when true)	α
probability of a type II error (acceptance of the null hypothesis when false)	β
second (angular)	"
standard deviation	SD
standard error	SE
variance	
population	Var
sample	var

FISHERY MANAGEMENT REPORT NO. 17-58

2018 REPORT TO THE ALASKA BOARD OF FISHERIES: SOUTHEAST ALASKA–YAKUTAT HERRING FISHERIES

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The Fishery Management Reports series was established in 1989 by the Division of Sport Fish for the publication of an overview of management activities and goals in a specific geographic area, and became a joint divisional series in 2004 with the Division of Commercial Fisheries. Fishery Management Reports are intended for fishery and other technical professionals, as well as lay persons. Fishery Management Reports are available through the Alaska State Library and on the Internet: http://www.adfg.alaska.gov/sf/publications/. This publication has undergone regional peer review.

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ABSTRACT

Pacific herring in Southeast Alaska and Yakutat are harvested for commercial bait, commercial sac roe, commercial spawn-on-kelp, subsistence spawn-on-branches, subsistence spawn-on-kelp, and personal use fisheries and Alaska Department of Fish and Game test fisheries. Prior to 1967, a reduction fishery accounted for most of the commercial harvest with a historic high of 78,749 tons during the 1929/30 season. A winter bait fishery has generally occurred every year since the turn of the century. The sac roe fisheries became the dominant fishery beginning in 1971. A wild spawn-on-kelp fishery occurred between 1963 and 1969, with a closed pound fishery authorized by the Board of Fisheries beginning in 1990. During the most recent completed season of 2016/17 season, the total regional commercial harvest of herring, including estimates of herring used for commercial spawn on kelp, was 15,457 tons. The sac roe harvest totaled 13,923 tons. The commercial harvest of spawn on kelp product was 70 tons, resulting in an estimated 875 tons of herring caught for supplying pounds. Commercial harvest in the winter bait fishery totaled 527 tons. Test fisheries in the region accounted for approximately 133 tons of herring. No herring fishery occurred in the Yakutat area. The management strategy for herring combines a sliding scale harvest rate and minimum biomass threshold to determine allowable harvest levels. Harvest rates may be set between 10% and 20% of forecasted mature biomass, when above threshold, except in Sitka Sound where harvest rates may be set between 12% and 20%.

Keywords: commercial herring harvest, 2016/17 herring season, commercial bait, commercial sac roe, commercial spawn-on-kelp, subsistence, personal use fisheries, Southeast Alaska, Yakutat

INTRODUCTION

This report summarizes historical harvests and management actions primarily for commercial herring fisheries in Southeast Alaska and Yakutat (Region I) through the 2016/17 season with an outlook for the 2017/18 season. The Southeast Alaska Region is a composite of two Registration Areas. Area A, the Southeast Alaska area, encompasses the waters south of Cape Fairweather and north of the International Boundary at Dixon Entrance. Area D, the Yakutat area, extends west from Cape Fairweather to Cape Suckling (Figure 1). Commercial winter bait, sac roe, spawn-on-kelp, and bait pound fisheries occur in only the Southeast Alaska area. Only a winter bait season is provided by regulation in the Yakutat area. In addition, both subsistence and personal use harvesting of herring and herring eggs on various substrates such as branches, kelp and other sea weeds occurs in both areas.

HISTORY OF THE HERRING FISHERY

Pacific herring spawning stocks are found throughout Southeast Alaska. Spawning stocks vary greatly in size and productivity. In general, herring that spawn in the outer-coastal areas are more productive than those that spawn in the inside waters. Subsistence uses of herring and herring eggs by native Alaskans have existed in Southeast Alaska for thousands of years and herring have held a great deal of cultural importance (Sill and Cunningham 2017). Beginning in the 1880s, herring were first commercially harvested for salting operations. From the 1890s to the mid-1960s commercial catch was used primarily to supply herring for reduction to meal and oil. The reduction fishery occurred on mixed aggregates of feeding herring during the summer months. The reduction fishery peaked during the 1920s and 1930s when annual harvests commonly exceeded 50,000 tons (Table 1). The reduction industry was phased out in the mid-1960s due a decline in the abundance of herring and to the development of the Peruvian anchovy reduction industry.

Southeast Alaska herring have historically supplied most of the bait for Alaska commercial longline and pot fisheries. This harvest occurs during the fall and winter months, a time when bait quality is best, on discrete wintering schools in major bays and inlets. All of the bait harvest

is taken by purse seine gear. Relatively small quantities of herring have been harvested for fresh bait pounds. Existing regulations provide for a tray-pack bait fishery designed to produce a sport and commercial troll bait product; however, very little harvest has occurred for this purpose in recent years.

Currently, most of the annual herring harvest is taken in the spring commercial sac roe fishery, which developed in the early 1970s. The sac roe fishery takes herring immediately prior to spawning when egg maturity is highest. A commercial wild spawn-on-kelp fishery occurred during the 1960s; however, this fishery was phased out in 1969. A new commercial herring spawn-on-kelp pound fishery was approved by the Alaska Board of Fisheries (board) to begin in the spring of 1990 in Hoonah Sound. In 1992 the board created another commercial spawn-on-kelp pound fishery for the Craig/Klawock area and in 2003 created spawn-on-kelp pound fisheries in Ernest Sound and Tenakee Inlet.

Herring continue to be important for subsistence and personal use. Traditional subsistence and personal use catch has included herring, spawn on branches, and spawn on kelp. These fisheries require no permit with the exception of spawn on kelp. There is no closed season and a wide range of gear types may be used.

The commercial utilization of Southeast Alaska herring resources has been historically controversial, and that remains true today. Although subsistence and personal use harvests constitute a minor portion of the total annual take, they are considered very important to the lifestyle and culture of local residents. Commercial harvesting is perceived by much of the public to have a large impact on the local availability of herring and herring spawn. Additionally, herring are important prey for many marine animals and healthy populations are generally viewed as necessary for ensuring healthy populations of predatory fish, such as salmon and halibut, and other marine life such as marine birds and several species of marine mammals, including whales and sea lions.

MANAGEMENT STRATEGY

The following management plan forms the regulatory basis for all Southeast Alaska commercial herring fisheries, and was formalized at the January 1994 Board of Fisheries meeting.

> 5 AAC 27.190. *Herring Management Plan For Southeastern Alaska Area*. For the management of herring fisheries in the Southeastern Alaska Area, the Alaska Department of Fish and Game (department):
>
> (1) Shall identify stocks of herring on a spawning area basis;
>
> (2) Shall establish minimum spawning biomass thresholds below which fishing will not be allowed;
>
> (3) Shall assess the abundance of mature herring for each stock before allowing fishing to occur;
>
> (4) Except as provided elsewhere, may allow a harvest of herring at an exploitation rate between 10 percent and 20 percent of the estimated spawning biomass when that biomass is above the minimum threshold level;
>
> (5) May identify and consider sources of mortality in setting harvest guidelines;

(6) By emergency order, may modify fishing periods to minimize incidental mortalities during commercial fisheries.

Section 16.05.940(16) defines a stock as "...a species, subspecies, geographic grouping or other category of fish manageable as a unit" and is here synonymous with spawning aggregate.

A "threshold level" is the minimum herring biomass needed to allow sustained yield and maintain biological productivity, and below which commercial fisheries are not allowed. Threshold levels have been established for each of the winter bait, sac roe, and spawn-on-kelp pound spawning stocks. Threshold levels are based on all available data and may be evaluated and revised over time. Current threshold levels in Southeast Alaska (i.e., not including Yakutat) vary from 2,000 to 25,000 tons of mature herring for the commercial sac roe, winter bait, and spawn-on-kelp fisheries (Table 3).

For most stocks in the region, threshold levels were determined based on historical biomass levels and the minimum GHL for which a commercial fishery could be accurately managed. For some stocks, threshold levels were set as 25%, or more, of the estimated unfished (pristine) biomass, as estimated using computer simulations. These stocks in include Sitka Sound, Tenekee Inlet, and West Behm Canal. Threshold levels for all stocks were not set using 25% of pristine biomass, because of inadequate data time series or higher analytical priorities. For Sitka Sound, an analysis in 1997 estimated 25% of pristine biomass to be 16,800 tons under the environmental conditions at the time. In acknowledgement of concerns for subsistence, the board set the threshold at 20,000, rather than 16,800 tons, in 1997 and increased it to 25,000 tons in 2009. Sitka Sound is the only stock for which the threshold is in regulation.

Herring spawning stocks with a biomass of less than 2,000 tons, of which there are many, are not considered for harvesting in the Southeast Alaska winter bait, sac roe, or spawn-on-kelp fisheries. Under the current approach for setting seasonal harvest limits, herring spawning stocks of 2,000 tons of adult fish would allow for an annual harvest of 200 tons of herring. Accurately managing for GHLs below this level would be difficult as the number of fishery permit holders and thus fishing effort levels would be too high. The exception is the Yakutat winter bait fishery (outside of Yakutat Bay, which is closed to commercial herring fishing), where the spawning threshold is 1,000 tons, and effort would be lower.

Allowable Harvest Rates

Annual harvest limits are based on a graduated scale that allows for higher harvest rates as the forecasted mature herring population increases relative to the threshold level (Figure 2). The approach allows for an annual harvest rate of between 10–20% (for Sitka Sound 12–20%) when the forecasted spawning biomass is at or above established threshold levels. No commercial harvest is allowed if the forecasted spawning biomass is less than the threshold. For all areas, except Sitka Sound, when the forecasted spawning biomass is at the threshold level, a 10% harvest is allowed and the harvest rate increases 2% for each increase in spawning biomass of an amount equal to the threshold level. The harvest rate reaches a maximum of 20% when the stock is six times the threshold level. For Sitka Sound, when the spawning stock is forecasted to be at the threshold of 25,000 tons, the harvest rate is 12%, which increases by 8% with each increase in spawning biomass of an amount equal to the threshold level. This results in a maximum harvest rate of 20% when the forecasted spawning biomass is twice the threshold. A more rapidly increasing graduated harvest rate is used for Sitka Sound because the stock is

substantially larger and generally considered to be more productive than other herring stocks in the region.

Current allowable harvest rates were based on computer simulations of Pacific herring in Prince William Sound (PWS) and in the eastern Bering Sea (EBS) that compared how populations would respond to a wide range of harvest rate and biomass threshold combinations. Harvest rates and threshold levels need to be considered jointly, such that with higher harvest rates, higher thresholds are necessary to protect populations. With goals of minimizing the risk of population collapse, maximizing yield, minimizing variation in yield, and keeping consistency with the previous maximum 20% harvest rate, the recommended optimal threshold range was 15–25% of pristine biomass. Considering these goals together resulted in much lower exploitation rates than those under maximum sustainable yield, with much less annual variation and much lower probability of population collapse and fishery closures. Additionally, because a single-species model was used for this analysis, which did not consider interactions between species, the use of the upper value (25%) in the threshold range of was recommended as a precaution for the ecosystem. For some Southeast Alaska herring stocks (Sitka Sound, West Behm Canal, and Tenakee Inlet), thresholds were based on a minimum of 25% of pristine biomass, while thresholds for all others were set based on historical fished biomass levels because a threshold analysis has not been conducted.

The current harvest rate strategy (i.e. combination of sliding scale harvest rate and threshold), which was first implemented in 1983, and the specific harvest rate and threshold values, established in 1998 and updated in 2009, have been considered to be conservative for the Sitka herring population. The maximum harvest rate allowed under the harvest rate strategy used for Sitka and all other Southeast Alaska herring stocks is consistent with most other herring fisheries in Alaska and along the west coast of North America. It has been considered conservative, in part because, although analysis determined that a fixed 20% harvest rate was sustainable at any stock level that is above threshold, the inclusion of a sliding scale reduces the harvest rate to 10% as stocks near the threshold. However, more recent research in British Columbia (BC) and elsewhere suggests that harvest rates and threshold levels may need to be reevaluated to better avoid states of low biomass and low productivity and to allow populations to recover from such states. In particular, research indicates that harvest rates of 20% may not be effective at allowing stocks in low productivity states to rebuild, and that thresholds in BC should be set high enough so that the probability of the population falling below 30% of pristine biomass is very low.

Herring populations in Southeast Alaska have experienced periods of stability, increase, and decrease under the current harvest rate strategy. For instance, the spawning biomass in Sitka was stable from 1980–1994 under an average realized (not target) harvest rate of 15%; increased from 1995–2009 under an average realized harvest rate of 14%; and decreased from 2010–2017 under an average realized harvest rate of 17%. The realized harvest rate in the latter time period would have been about 21% if the GHL had been achieved for all years. The harvest rate in the latter two time periods was based on a target harvest rate of 20%. Given the similarity of realized average harvest rates among these time periods, it is likely that changing environmental conditions impacted population growth over these time periods, possibly in concert with commercial harvest. Similar increases in the mid-1990s and decreases in the mid- to late-2000s in Sitka, Seymour Canal, and Craig, also suggest that large-scale environmental conditions have influenced these herring populations. Although in recent years populations in Southeast Alaska have declined, the sustained increases observed between the mid-1990s and about 2011 suggest

that the current harvest rate strategy did not prevent population growth, at least under the ocean conditions during those years. However, ocean conditions may be changing or may change in the future and population growth patterns may not be the same under different ocean conditions. In general, herring can sustain higher harvest rates than longer lived, slower maturing species like sablefish or lingcod because their more frequent recruitment and short lifespans allow populations to rebound more quickly when stocks are at low levels. However, precaution is necessary because environmental influences can force populations to lower stock size equilibria prematurely and more frequently when there is harvest pressure, and also because the consequences of population decreases of herring are high due to their key role in the ecosystem and importance to users of the resource.

Current allowable harvest levels account for predation of herring by fish, marine mammals and birds, because they were based on models that included average natural mortality of herring over time. The model that estimates population levels does not break out natural mortality by predator species because the quality of predator data is insufficient, and modeling total natural mortality is likely more accurate than what could be obtained by separating into components attributable to predator species. Allowable harvest levels do not factor in changes to herring mortality that are caused by phenomena in the forecast year that are outside of historical patterns, such as a sudden large influx of new predators or a large reduction in prey items due to extreme ocean temperature.

Most fishery scientists agree that herring and forage fish in general are important links in marine food webs, serving as prey for many species. There is also concern by many people that commercial fisheries may have negative impacts on predators of herring and the marine ecosystem, if prudent conservation is not exercised. Scientists have recently reviewed forage fish harvest rate strategies as they pertain to the entire ecosystem, and recommended that harvest rates for forage fish should be limited to 50% of F_{MSY} and that minimum biomass thresholds for fishing should be at least 40% pristine biomass to maintain adequate forage for other species. However, other scientists have disagreed and have countered that the studies behind these recommendations greatly overstate the impact on predators caused by fishing on forage fish. Nonetheless, there is general agreement that great care must be taken with commercial exploitation of forage fish to prevent unintended negative consequences to other marine populations.

Stock Assessment

Historically, there have been two direct observation methods for estimating herring biomass in Southeast Alaska: (1) egg deposition dive surveys and (2) vessel hydroacoustic surveys. In cases where egg deposition surveys are used, the biomass estimate is based on data only from mature herring that spawned that season. Winter acoustic surveys have not been used for comprehensive estimates of biomass since the 1993/94 season, because the method is thought to be less reliable than egg deposition estimation. Beginning in 1994, the department modified the primary method of forecasting herring abundance for major spawning aggregates in Southeast Alaska. Age Structured Analysis (ASA), which relies on a time series of herring stock assessment data, was used to forecast herring biomass for those spawning stocks with adequate historical data (Kah Shakes/Cat Island, Craig, Sitka Sound, Tenakee Inlet, and Seymour Canal). The ASA method is also used to forecast spawning biomass of herring in Southcentral Alaska, the Eastern Bering Sea, and British Columbia. Different forms of ASA models are also integral parts of the biomass assessment for most groundfish stocks in the Bering Sea and the Gulf of Alaska. The ASA

method uses estimates of recruitment, age, growth, maturation, natural mortality, weight-at-age, and spawning escapement to forecast herring abundance. Age and growth information is obtained by samples collected from test fishing, commercial harvests, mid-water trawling (department survey), and sampling on the spawning grounds by the department. Forecasts for herring in other areas in Southeast Alaska, where ASA modeling is not conducted, are currently computed using a biomass accounting method where the observed spawning biomass and age composition from one year is modified by estimates of growth and mortality from nearby stocks that are assessed with ASA models to produce a subsequent year's biomass forecast.

In the future, ASA-based forecasts may be applied to other areas as the time series of data for those areas becomes sufficient. However, recently reduced state budgets are expected to prevent further collection of data that is required for ASA modeling in other areas. If data collection resumes in future years and budgets allow, the department plans to use ASA models in additional areas where there is regular, annual collection of relevant age composition and abundance data.

2016/17 SEASON SUMMARY

The 2016/17 season commercial herring catch totaled approximately 15,458 tons of herring and herring equivalents (for spawn-on-kelp fisheries where mature herring are not harvested; Tables 1 and 2). The catch included 527 tons of winter bait herring and 13,923 tons of sac roe herring. The "equivalent" of 875 tons of herring was captured in spawn-on-kelp fisheries, based on an estimated ratio of 12.5 tons of herring per 1 ton of spawn-on-kelp product. Herring experience mortality, immediate or delayed, resulting from handling during capture and impoundment. Although herring are released from pounds after spawn-on-kelp fisheries, for stock assessment purposes a mortality rate of 75% is assumed. Approximately 133 tons of bait herring were caught in a test fishery conducted in Sitka Sound.

Six sac roe herring fisheries are established by regulation. They include two exclusive purse seine areas (Sitka Sound and Lynn Canal) and two exclusive set gillnet areas (Kah Shakes/Cat Island and Seymour Canal). Regulations for the Hobart Bay/Port Houghton area provide for a herring gillnet fishery if the winter bait fishery does not harvest the entire guideline harvest level (Figure 4). West Behm Canal provides for a commercial sac roe fishery such that set gillnet and purse seine fisheries alternate fisheries (5 AAC 27.197). Both gear types are under a limited entry system. A sac roe fishery was opened only in Sitka Sound in 2017. The Kah Shakes/Cat Island area has remained below threshold since the 1998/99 season. Lynn Canal was below threshold during the 2017 spawning season, and although survey results indicated that the spawning biomass was above the threshold in 2013, it has been below threshold in all other years since late 1970s.

A spawn-on-kelp pound fishery was only conducted in Craig during 2017. The winter bait fishery was also only opened in Craig.

2016/17 WINTER FOOD AND BAIT FISHERY

Winter herring fishing for food and bait is allowed by regulation in Districts and/or Sections 1-10, 11-B, 11-C, 12, 13-A, 13-B (only south of the latitude of Aspid Cape), 14, 15-A, and 16 in Southeast Alaska. In the Yakutat area, Yakutat Bay is closed to herring fishing.

The fishing season is set by regulation from October 1–February 28. In Southeast Alaska, regulations specify that open fishing periods be established by emergency order. Although the

existing regulations specify purse seines and set gillnets as legal allowable gear, only purse seine gear has been fished in recent years.

Only one area was identified as having harvestable quantities of bait herring during the 2016/17 winter season (Figure 3): the Craig/Klawock area with a bait guideline harvest level (GHL) of 523 tons. This area was open to the commercial harvest of herring on October 17, 2016, and closed by regulation February 3, 2017. A total of 527 tons of bait was harvested from this area (Table 4). No other bait area was opened during the 2016/17 season because their forecasts of mature biomass were below threshold.

2016/17 TEST FISHERIES

One test fishery was conducted in Southeast Alaska during the 2016/17 season. The test fishery was conducted in Sitka Sound, where 133 tons of winter bait was harvested. Test fishery revenues were used to defray costs for managing and assessing herring populations.

2016/17 SAC ROE FISHERY

The sac roe harvest was composed of a purse-seine catch of 13,923 tons from Sitka Sound (Table 5). Forecasted biomass was below minimum population threshold levels for all other sac roe areas, including Seymour Canal, Lynn Canal, Kah Shakes/Cat Island, and Hobart/Houghton, and no fisheries were allowed in these areas during the 2016/17 season.

The Sitka Sound 2017 mature biomass forecast resulted in a GHL of 14,649 tons. The Sitka Sound sac roe fishery went on two-hour notice effective 0800, March 17, 2017. A total of 13,883 tons was harvested during three days of competitive openings on March 19, 22, and 25 for a combined total elapsed time of 6 hrs 55 min. Two days of non-competitive fisheries were opened on March 27 and 28, when an additional 40 tons of herring were harvested. There are 48 limited entry permits in this fishery; all permit holders were registered for the fishery, and 43 reported landing product.

2016/17 HERRING POUND FISHERIES

There are three types of herring impoundment or “pound” fisheries in Southeast Alaska: tray pack bait, fresh bait, and spawn on kelp. The tray pack pound fishery was created in 1979 when the board allocated a harvest of up to 100 tons. Fresh bait pounds have historically been allowed by regulation under a permit system in several areas (Figure 5). The conduct and management of the fresh bait and tray pack pound fisheries are essentially the same in that herring are impounded in net pens for a period of time to be sold as bait and both require a commissioner’s permit. During the 2003 board meeting the two fisheries were combined under one management plan, 5 AAC 27.180 and 5 AAC 27.160(b). In recent years there has been relatively little participation in either of the fresh bait pound fisheries (Table 6).

There are four spawn-on-kelp pound fisheries in Southeast Alaska, divided into two permit areas: Craig/Klawock and Ernest Sound in the Southern Southeast permit area (defined as Districts 1-8), and Hoonah Sound and Tenakee Inlet in the Northern Southeast permit area (defined as Districts 9-16) (Figure 7). The spawn-on-kelp fishery for the Craig/Klawock area was initiated in the spring of 1992. The total GHL of herring is shared with the bait fishery with 60% allocated to the bait fishery and 40% (plus any remaining bait allocation) allocated to the spawn-on-kelp fishery. The 60:40% allocation split was new as of the 1997/98 season due to board action (at the January 1997 meeting) that changed the previous allocation of 85% for bait and 15% for spawn on kelp.

During its meeting in January 2003, the board created two new herring spawn-on-kelp fisheries in Southeast Alaska: District 7 (Ernest Sound) and Section 12-A (Tenakee Inlet). The Ernest Sound fishery is considered part of the Southern Southeast spawn-on-kelp limited entry fishery, and Tenakee Inlet is considered part of the Northern Southeast spawn-on-kelp limited entry fishery. In Ernest Sound, the spawn-on-kelp fishery is allocated any remaining GHL that is not harvested by the winter food and bait fishery or the bait pound fishery. In Tenakee Inlet, the spawn-on-kelp fishery is allocated any remaining GHL that is not harvested by the winter food and bait fishery or the bait pound fishery.

At past Board of Fisheries meetings, proposals have been submitted requesting creation of a spawn-on-kelp fishery in the Sitka Sound area. Currently, this stock is fully allocated to the sac roe purse seine fishery, and limited entry permits are authorized by the Commercial Fisheries Entry Commission (CFEC). However, because Sitka Sound falls within the area defined for Northern spawn-on-kelp fisheries, only holders of Northern spawn-on-kelp fishery permits would be eligible for a spawn-on-kelp fishery in Sitka Sound. The authority to modify eligibility rests with CFEC.

For the 2016/17 season, the only spawn-on-kelp fishery to open was for the Craig/Klawock area, where the spawn-on-kelp herring allocation was set at 349 tons or 40% of the total area GHL of 872. There were a total of 19 closed pounds (all with six permits per pound) and two open pounds on the grounds during the 2016/17 season. The landings of spawn-on-kelp product totaled 69.9 tons (Table 7).

HERRING SUBSISTENCE FISHERIES

Spawn-On-Branch

Harvest of spawn on branches occurs in several communities in Southeast Alaska, such as Craig and Klawock, but most effort takes place in Sitka Sound. Subsistence harvest monitoring surveys began in Sitka Sound in 2002 in response to concerns from subsistence harvesters that the commercial sac roe herring fishery was negatively affecting subsistence harvesting success. The surveys are conducted through collaboration between the department and Sitka Tribe of Alaska. The data generated from the survey is used to calculate estimates of the subsistence harvest of herring spawn on various substrates, including hemlock branches, kelp, and other seaweed in Sitka Sound. An estimated total of 84,554 pounds of herring spawn was harvested in 2016. Approximately 97% of the harvest was shared with other households within Sitka as well as other communities in the state and beyond.

For areas in Southeast Alaska outside Sitka Sound, information about subsistence effort and harvest of spawn on branches is scarce. In these areas, harvest of spawn on branches is thought to be much lower that of Sitka Sound.

Spawn-On-Kelp

The harvest of “wild” herring spawn on kelp has occurred traditionally throughout the region. The Southeast Alaska fishery is regulated solely through the issuance of subsistence spawn-on-kelp permits at local department offices, whereas no permit is required for the Yakutat area. The permits specify times, areas, and amounts of spawn on kelp allowed. The annual possession limit for herring spawn-on-kelp is 32 lb for an individual or 158 lb for a household of two or more persons. Additional permits for herring spawn on kelp above the annual possession limit are allowed at the department’s discretion.

Subsistence spawn-on-kelp harvests generally occur in March and April near Craig, Hydaburg, and Sitka, where major herring spawning populations are found (Figure 6). *Macrocystis* kelp is the preferred species of kelp. In 2017, based on department permits, an estimated combined total of 5,262 lb (Table 8) of wild spawn-on-kelp product was harvested in these areas.

HISTORICAL VALUE

Exvessel value data for Southeast Alaska herring fisheries was obtained September 27, 2017, from the CFEC website at http://www.cfec.state.ak.us/bit/mnuherr.htm for 1977–2016. Data for 2017 from CFEC is not expected to be available until late 2018, and 2016 data is preliminary. Data is not inflation adjusted. Questions, definitions, and additional information concerning exvessel value may be directed to the above web site and CFEC, and it is reproduced here for convenience (Table 9). CFEC data is collected and recorded on a calendar-year basis. Consequently, winter bait fishery values represent an estimate of the values of the fishery, rather than from the actual fishery season, which crosses calendar years.

From 1995 (when all present fishery types became developed) through 2016, the combined total commercial exvessel values have ranged from a low of $1,563,000 in 2016 to a high of $21,002,000 in 2008. Generally, the largest percentage of the total value occurs in the seine sac-roe fishery (Table 9).

2017/18 SEASON OUTLOOK

After a period of building since about the late 1990s, herring spawning biomass in Southeast Alaska has declined since about 2011. The spawning biomass estimated through 2016 for Southeast Alaska is at a level similar to that of the late 1990s prior to the increase in herring biomass (Figure 8).

The degree of decline in herring biomass varies by spawning area. In some areas, such as Hoonah Sound and Seymour Canal, spawning biomass has declined dramatically, whereas in others, such as Sitka and Craig, the decline appears to be much more gradual. However, regardless of the level of decline, commercial harvest opportunity will undoubtedly be reduced for the 2017/18 herring fishing seasons, compared to previous seasons.

Beginning in 2017, the department substantially reduced its herring stock assessment program as a result of cuts to state funding. The annual surveys that have been conducted for many years to estimate spawning biomass and age composition have been suspended for all areas except Sitka Sound and Craig. Consequently, biomass forecasts for only these two areas will be conducted for the 2017/18 season. Although some aerial surveys may be continued in some other areas, these will only be conducted to continue monitoring herring stocks at a basic level and the department does not intend to open commercial fisheries in any area other than Sitka Sound and Craig.

The Sitka Sound area forecast of mature biomass for 2018 is 55,637 tons and the GHL for the 2018 sac roe fishery is 11,128 tons. The GHL represents an allowable harvest rate of 20.0%.

The Craig area is also forecasted to be above threshold for the 2017/18 season. The forecast for mature biomass is 16,039 tons and the total GHL is 2,312 tons based on an allowable harvest rate of 14.4%. The winter food and bait herring fishery opened in Southeast Alaska on October 18, 2017, only in the Craig/Klawock area. The winter food and bait GHL for this area for the 2017/18 season is 1,387 tons, based on an allocation of 60% of the total GHL (5 AAC

27.185(c)). The remaining 40%, plus any portion not harvested during the winter bait fishery, is allocated to the spawn-on-kelp fishery.

The only spawn-on-kelp fishery that will open during the 2017/18 season is in the Craig/Klawock area. The GHL will be 925 tons, plus any remaining GHL from the winter food and bait fishery.

Although there are areas where quotas set in regulation will be available to the commercial bait pound fishery (Figure 5), there are several areas where biomass will not be forecasted and the department's policy is to not open fisheries in these areas unless biomass is above threshold.

TABLES AND FIGURES

Table 1.–Southeast Alaska herring harvests in tons, 1900/01 to 2016/17.

Season	Total harvest[a,b]	Season	Total harvest[a,b]	Season	Total harvest[a,b]	Season	Total harvest[a,b]
1900/01	1,194	1930/31	70,855	1960/61	38,906	1990/91	6,034
1901/02	1,250	1931/32	44,857	1961/62	24,709	1991/92	9,975
1902/03	812	1932/33	49,786	1962/63	16,959	1992/93	12,253
1903/04	1,494	1933/34	61,588	1963/64	15,703	1993/94	7,514
1904/05	1,521	1934/35	66,842	1964/65	23,553	1994/95	5,104
1905–06	1,309	1935/36	58,155	1965/66	12,390	1995/96	9,854
1906/07	1,005	1936/37	36,713	1966/67	5,670	1996/97	14,729
1907/08	1,382	1937/38	50,334	1967/68	3,214	1997/98	10,590
1908/09	1,711	1938/39	22,356	1968/69	1,852	1998/99	12,903
1909/10	1,075	1939/40	20,028	1969/70	2,644	1999/00	6,451
1910/11	6,867	1940/41	3,137	1970/71	5,015	2000/01	14,706
1911/12	12,057	1941/42	6,230	1971/72	3,867	2001/02	13,671
1912/13	16,067	1942/43	3,691	1972/73	6,307	2002/03	11,950
1913/14	13,496	1943/44	6,235	1973/74	7,837	2003/04	17,015
1914/15	8,318	1944/45	16,801	1974/75	7,985	2004/05	18,410
1915/16	6,964	1945/46	24,126	1975/76	7,942	2005/06	14,287
1916/17	11,194	1946/47	37,564	1976/77	8,640	2006/07	16,014
1917/18	12,445	1947/48	41,829	1977/78	6,071	2007/08	21,520
1918/19	17,825	1948/49	16,125	1978/79	6,532	2008/09	22,308
1919/20	10,962	1949/50	14,279	1979/80	9,217	2009/10	24,779
1920/21	16,452	1950/51	13,411	1980/81	8,393	2010/11	23,805
1921/22	6,012	1951/52	10,652	1981/82	8,723	2011/12	17,407
1922/23	16,950	1952/53	16,020	1982/83	9,764	2012/13	8,922
1923/24	21,240	1953/54	12,435	1983/84	9,076	2013/14	23,345
1924/25	29,395	1954/55	6,446	1984/85	11,079	2014/15	11,961
1925/26	57,782	1955/56	11,368	1985/86	9,792	2015/16	11,871
1926/27	73,843	1956/57	22,819	1986/87	8,369	2016/17	15,457
1927/28	45,310	1957/58	24,745	1987/88	16,152	—	—
1928/29	53,007	1958/59	38,797	1988/89	16,191	—	—
1929/30	78,749	1959/60	49,866	1989/90	8,194	—	—

[a] Harvests include the fresh bait pound harvest and test fishery harvests.

[b] Includes spawn-on-kelp harvests converted to herring equivalents at 12.5 to 1 ratio.

Table 2.–Southeast Alaska annual herring catch (tons) by fishery, 1960/61 through 2016/17 seasons. Dashes indicate years when no fishery took place.

Season	Reduction	Winter Bait	Spawn on Kelp[a]	Sac Roe	Test [b]	Bait Pound	Total[b]
1960/61	36,790	2,116	—	—	—	—	38,906
1961/62	22,869	1,840	—	—	—	—	24,709
1962/63	13,765	3,172	22	—	—	—	16,959
1963/64	13,539	2,064	100	—	—	—	15,703
1964/65	21,397	1,957	199	—	—	—	23,553
1965/66	10,062	2,094	234	—	—	—	12,390
1966/67	2,918	2,422	330	—	—	—	5,670
1967/68	—	3,025	189	—	—	—	3,214
1968/69	—	1,816	36	—	—	—	1,852
1969/70	—	2,644	—	—	—	—	2,644
1970/71	—	3,324	—	1,691	—	—	5,015
1971/72	—	2,045	—	1,822	—	—	3,867
1972/73	—	3,954	—	2,353	—	—	6,307
1973/74	—	5,856	—	1,981	—	—	7,837
1974/75	—	5,910	—	2,075	—	—	7,985
1975/76	—	5,688	—	2,254	—	—	7,942
1976/77	—	6,409	—	2,231	—	—	8,640
1977/78	—	4,042	—	2,029	—	—	6,071
1978/79	—	3,485	—	3,047	—	—	6,532
1979/80	—	2,717	—	6,500	—	—	9,217
1980/81	—	1,671	—	6,722	—	—	8,393
1981/82	—	1,530	—	7,193	—	—	8,723
1982/83	—	1,030	—	8,713	—	21	9,764
1983/84	—	620	—	8,411	—	45.2	9,076
1984/85	—	1,406	—	9,636	—	37	11,079
1985/86	—	2,442	—	7,319	—	31	9,792
1986/87	—	2,347	—	5,957	—	65	8,369
1987/88	—	4,016	—	11,246	—	17	15,279
1988/89	—	3,155	—	12,970	—	66	16,191
1989/90	—	3,843	12	4,163	—	38	8,194
1990/91	—	3,273	13.3	2,514	—	81	6,034
1991/92	—	2,719	48.8	6,614	—	32.3	9,975
1992/93	—	1,052	19.7	10,955	—	*	12,253
1993/94	—	879	49.2	5,884	136	0	7,514
1994/95	—	464	54.4	3,850	110	0	5,104

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Table 2.–Page 2 of 2.

Season	Reduction	Winter Bait	Spawn on Kelp[a]	Sac Roe	Test [b]	Bait Pound	Total[b]
1995/96	—	484	37.3	8,749	155	0	9,854
1996/97	—	727	88	12,726	176	0	14,729
1997/98	—	840	108.4	8,233	162	0	10,590
1998/99	—	1,033	108	10,348	172	0	12,903
1999/00	—	926	36	4,966	109	*	6,451
2000/01	—	775	92.2	12,654	124	0	14,706
2001/02	—	355	171.9	10,854	306	6.8	13,671
2002/03	—	*	263.4	8,570	87	0.6	11,950
2003/04	—	*	447.4	11,296	231	7.3	17,015
2004/05	—	553	392.2	12,515	440	*	18,410
2005/06	—	689	191.1	11,155	55	0	14,287
2006/07	—	576	203.9	12,790	99	0	16,014
2007/08	—	655	386.5	15,900	134	0	21,520
2008/09	—	804	438.5	15,963	60	0	22,308
2009/10	—	1,021	407.0	18,615	55	0	24,779
2010/11	—	670	263.7	19,778	60	0	23,805
2011/12	—	552	285.0	13,232	60	0	17,407
2012/13	—	*	202.0	6,337	60	0	8,922
2013/14	—	*	472.0	17,379	66	0	23,345
2015/16	—	*	*	9,833	200	0	10,033
2016/17	—	527	69.9	13,923	133	0	15,457

* When number of permits or processors is less than three, information is considered confidential.

[a] A spawn-on-kelp pound fishery was implemented in the spring of 1990; prior harvests were from the "wild" spawn-on-kelp fishery. Harvest is tons of spawn-on-kelp product.

[b] Includes spawn-on-kelp product converted to herring equivalents at 12.5 to 1 ratio; does not include confidential values.

Table 3.–Herring spawning threshold levels for major herring stocks in Southeast Alaska and Yakutat.

Area	Threshold Level (tons)
Hoonah Sound	2,000
Yakutat Bay	1,000
Ernest Sound	2,500
Anita Bay	2,500
Port Camden	2,500
Hobart Bay/Port Houghton	2,000
Lisianski Inlet	2,500
Seymour Canal	3,000
Tenakee Inlet	3,000
Tongass Narrows and George and Carroll Inlets	3,500
Craig/Klawock	5,000
Kah Shakes and Cat Island	6,000
Lynn Canal	5,000
Sitka Sound	25,000
West Behm Canal	6,000
Other aggregates not included above	2,000

Table 4.–Southeast Alaska winter food and bait herring harvest in tons, by fishing area and season, 1982/83 through 2016/17.

Season	Craig / Klawock	Anita Bay	Ernest Sound	Hobart Bay / Houghton	Port Camden	Tenakee Inlet	Lisianski Inlet	Whale/ Necker Bay	Scow Bay	Slocum Arm	Total
1982/83	140	124	0	0	0	749	0	0	17	0	1,030
1983/84	0	0	0	0	42	619	0	0	0	0	661
1984/85	0	0	0	0	0	1,406	0	0	0	0	1,406
1985/86	302	0	0	0	0	2,040	0	0	0	0	2,342
1986/87	1,231	0	0	0	0	1,275	0	0	0	0	2,506
1987/88	2,014	0	0	0	0	1,577	280	0	0	257	4,128
1988/89	1,730	0	0	0	0	655	770	0	0	0	3,155
1989/90	3,221	0	0	0	0	595	27	0	0	0	3,843
1990/91	3,272	0	0	0	0	0	0	0	0	0	3,272
1991/92	2,295	0	0	0	0	0	353	0	0	0	2,648
1992/93	629	0	8	0	0	0	239	176	0	0	1,052
1993/94	636	0	0	140	0	0	0	103	0	0	879
1994/95	124	0	111	229	0	0	0	0	0	0	464
1995/96	34	0	220	230	0	0	0	0	0	0	264
1996/97	525	0	6	104	0	98	0	0	0	0	727
1997/98	254	0	0	0	0	586	0	0	0	0	840
1998/99	102	0	96	0	0	835	0	0	0	0	1,033
1999/00	*	0	0	432	0	494	0	0	0	0	*
2000/01	*	0	0	0	0	*	0	0	0	0	*
2001/02	*	0	0	0	0	*	0	0	0	0	*
2002/03	*	0	0	0	0	*	0	0	0	0	*
2003/04	*	0	*	0	0	*	0	0	0	0	*
2004/05	553	0	0	0	0	0	0	0	0	0	553
2005/06	689	0	0	0	0	0	0	0	0	0	689

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Table 4.–Page 2 of 2.

Season	Craig / Klawock	Anita Bay	Ernest Sound	Hobart Bay / Houghton	Port Camden	Tenakee Inlet	Lisianski Inlet	Whale/ Necker Bay	Scow Bay	Slocum Arm	Total
2006/07	576	0	0	0	0	0	0	0	0	0	576
2007/08	565	0	90	0	0	0	0	0	0	0	655
2008/09	143	0	*	0	0	*	0	0	0	0	804
2009/10	*	0	*	0	0	*	0	0	0	0	1,021
2010/11	*	0	*	0	0	0	0	0	0	0	670
2011/12	*	0	*	0	0	0	0	0	0	0	*
2012/13	*	0	*	0	0	0	0	0	0	0	539
2013/14	*	0	*	0	0	*	0	0	0	0	827
2015/16	*	0	0	0	0	0	0	0	0	0	*
2016/17	527	0	0	0	0	0	0	0	0	0	527

* Data considered confidential with fewer than three permits or processors.

Table 5.–Annual Southeast Alaska sac roe herring harvest by area, in tons, 1970/71 through 2016/17 seasons.

Season	Sitka Sound	Lynn Canal	Seymour Canal	Revillagigedo Channel	Other Areas	All Areas
1970/71	748	688	35	0	220[a]	1,691
1971/72	602	524	495	0	201[b]	1,822
1972/73	597	798	506	0	452[c]	2,353
1973/74	681	396	904	0	0	1,981
1974/75	1,517	558	0	0	0	2,075
1975/76	800	630	195	426	203[d]	2,254
1976/77	0	926	485	820	0	2,231
1977/78	175	954	729	171	0	2,029
1978/79	2,250	0	269	528	0	3,047
1979/80	4,385	975	0	1,140	0	6,500
1980/81	3,506	761	615	1,840	0	6,722
1981/82	4,363	551	0	2,279	0	7,193
1982/83	5,450	0	0	3,250	0	8,713
1983/84	5,830	0	518	2,182	0	8,411
1984/85	7,475	0	0	2,161	0	9,636
1985/86	5,443	0	339	1,537	0	7,319
1986/87	4,216	0	302	1,439	0	5,957
1987/88	9,575	0	586	1,087	0	11,246
1988/89	12,135	0	547	592	0	12,970
1989/90	3,804	0	359	0	0	4,163
1990/91	1,908	0	0	660	0	2,514
1991/92	5,368	0	0	1,246	0	6,614
1992/93	10,186	0	0	737	0	10,953
1993/94	4,758	0	382	749	0	5,884
1994/95	2,908	0	319	626	0	3,853
1995/96	8,144	0	0	605	0	8,749
1996/97	11,147	0	0	1,137	442[e]	12,726
1997/98	6,705	0	586	616	351[e]	8,233
1998/99	9,136	0	706	0	506[e]	10,348
1999/00	4,813	0	389	0	0	4,966
2000/01	11,972	0	620	0	0	12,654
2001/02	9,789	0	1,066	0	0	10,854
2002/03	7,051	0	1,519	0	0	8,570
2003/04	10,492	0	804	0	0	11,296
2004/05	11,366	0	945	0	204[e]	12,515
2005/06	9,967	0	1,187	0	0	11,155

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Table 5.–Page 2 of 2.

Season	Sitka Sound	Lynn Canal	Seymour Canal	Revillagigedo Channel	Other Areas	All Areas
2006/07	11,571	0	1,219	0	0	12,790
2007/08	14,386	0	1,208	0	306[e]	15,900
2008/09	14,755	0	867	0	341[e]	15,962
2009/10	17,602	0	710	0	302[e]	18,615
2010/11	19,419	0	*	0	*[f]	*
2011/12	13,232	0	0	0	0	13,232
2012/13	5,688	0	649	0	0	6,337
2013/14	16,957	0	*	0	0	16,957
2015/16	9,833	0	0	0	0	9,833
2016/17	13,923	0	0	0	0	13,923

* When number of permits or processors is less than three, information is considered confidential.

[a] Washington Bay (76 tons), Lisianski Inlet (100 tons).

[b] Lisianski Inlet.

[c] Yakutat Bay (158 tons), Helm Bay (194 tons), and Lisianski Inlet (100 tons).

[d] Helm Bay (26 tons), Chaik Bay (40 tons), Pybus Bay (22 tons), Gambier Bay (8 tons), and Kasaan Bay (107 tons).

[e] Hobart Bay/Port Houghton commercial sac roe gillnet fishery harvest, not including test fishery harvest.

[f] West Behm Canal commercial sac roe gillnet fishery harvest

Table 6.–Fresh herring bait pound harvests in tons by area, 1982/83 through 2016/17. Dashes indicate years when no fishery took place.

Season	Scow Bay	Farragut Bay	Sitka Sound	Tee Harbor	Indian Cove	Lisianski Inlet	West Behm Canal	Total Harvest
1982/83	7	14	0[a]	0	0	0	—	21
1983/84	0	10.2	35	0	0	0	—	45.2
1984/85	0	4.3	33	0	0	0	—	37.3
1985/86	0	5	26	0	0	0	—	31
1986/87	0	3	62	0	0	0	—	65
1987/88	0	0	17	0	0	0	—	17
1988/89	0	0	66	0	0	0[a]	—	66
1989/90	0	0	38	0	0	0	—	38
1990/91	0	16	65	0	0	0	—	81
1991/92	0	15	17	0	0	0	—	32
1992/93	0	0	*	0	0	0	—	*
1993/94	0	0	*	0	0	0	—	*
1994/95	0	0	0	0	0	0	—	0
1995/96	0	0	0	0	0	0	—	0
1996/97	0	0	0	0	0	0	—	0
1997/98	0	0	0	0	0	0	—	0
1998/99	0	0	0	0	0	0	—	0
1999/00	0	0	*	0	0	0	—	*
2000/01	0	0	0	0	0	0	—	0
2001/02	0	0	6.8	0	0	0	—	6.8
2002/03	0	0	*	0	0	0	0.6	0.6
2003/04	0	0	7.3	0	0	0	0	7.3
2004/05	0	0	*	0	0	0	0	*
2005/06	0	0	0	0	0	0	0	0
2006/07	0	0	0	0	0	0	0	0
2007/08	0	0	0	0	0	0	0	0
2008/09	0	0	0	0	0	0	0	0
2009/10	0	0	0	0	0	0	0	0
2010/11	0	0	0	0	0	0	0	0
2011/12	0	0	0	0	0	0	0	0
2012/13	0	0	0	0	0	0	0	0
2013/14	0	0	0	0	0	0	0	0
2015/16	0	0	0	0	0	0	0	0
2016/17	0	0	0	0	0	0	0	0

* When number of permits or processors is less than three, information is confidential.

[a] Pounds were allowed by regulation in Sitka Sound in 1983 and in Lisianski Inlet in 1989.

Table 7.–Herring spawn-on-kelp (SOK) pound fishery in tons of SOK product, 1989/90 through 2016/17. Dashes indicate years when no fishery took place. Asterisks signify confidential values.

Season	Craig / Klawock	Hoonah Sound	Ernest Sound	Tenakee Inlet	Total
1989/90	—	11.9	—	—	11.9
1990/91	—	13.2	—	—	13.2
1991/92	25.7	23.1	—	—	48.8
1992/93	5.7	14.0	—	—	19.7
1993/94	16.5	32.7	—	—	49.2
1994/95	25.4	29.0	—	—	54.4
1995/96	37.2	0.0	—	—	37.2
1996/97	23.0	65.0	—	—	88.0
1997/98	22.4	86.0	—	—	108.4
1998/99	36.0	71.6	—	—	107.6
1999/00	0.0[a]	35.7	—	—	35.7
2000/01	27.2	66.2	—	—	93.4
2001/02	41.7	136.6	—	—	178.3
2002/03	69.2	146.6	No Quota	47.6	263.4
2003/04	49.3	243.3	56.1	98.7	447.4
2004/05	115.2	183.3	No Quota	93.7	392.2
2005/06	29.0	162.1	No Quota	No Quota	191.1
2006/07	44.5	159.4	No Quota	No Quota	203.9
2007/08	148.5	228.1	9.8	No Quota	386.5
2008/09	137.3	234.7	2.5	64.1	438.5
2009/10	116.7	290.4	No Quota	No Quota	407.0
2010/11	70.0	193.7	No Quota	No Quota	263.7
2011/12	98.0	187.0	No Quota	No Quota	285.0
2012/13	138.0	0.0	65.0	No Quota	203.0
2013/14	*	No Quota	*	*	472.0
2015/16	*	No Quota	No Quota	No Quota	*
2016/17	69.9	No Quota	No Quota	No Quota	69.9

[a] Craig/Klawock 2000-pound GHL was 280 tons of herring. Estimated Craig spawning biomass was 9,591 tons. No product was landed.

Table 8.–Herring spawn-on-kelp subsistence estimated harvest (lb), 1965–2017. Dashes indicate years when no fishery took place.

	CRAIG-KLAWOCK-HYDABURG Permits			SITKA Permits			KAH SHAKES Permits			Other Permits		
Year	Issued	Returned	Estimated Harvest [a]	Issued	Returned	Estimated Harvest [a]	Issued	Returned	Estimated Harvest *	Issued	Returned	Estimated Harvest [a]
1967	201	130	3,368	—	—	—	—	—	—	—	—	—
1968	130	95	2,260	—	—	—	—	—	—	—	—	—
1969	80	61	2,858	—	—	—	—	—	—	—	—	—
1966	145	86	5,200	—	—	—	—	—	—	—	—	—
1970	103	60	3,213	—	—	—	—	—	—	—	—	—
1971	81	66	2,643	—	—	—	—	—	—	—	—	—
1972	102	44	4,250	—	—	—	—	—	—	—	—	—
1973	31	9	1,209	—	—	—	—	—	—	—	—	—
1974	159	39	3,087	—	—	—	—	—	—	—	—	—
1975	92	34	1,640	—	—	—	—	—	—	—	—	—
1976	54	12	1,728	—	—	—	—	—	—	—	—	—
1977	34	7	352	—	—	—	—	—	—	—	—	—
1978	109	83	3,521	—	—	—	11	8	122	—	—	—
1979	102	81	1,268	21	10	137	16	6	0	—	—	—
1980	309	189	3,721	19	13	145	33	24	75	—	—	—
1981	157	87	6,148	26	19	192	6	5	12	—	—	—
1982	187	81	5,485	36	25	886	30	18	342	—	—	—
1983	302	189	5,945	69	48	1,991	33	24	103	—	—	—
1984	261	159	4,972	50	40	1,281	14	6	116	—	—	—
1985	233	168	9,553	71	45	3,963	19	10	0	—	—	—
1986	241	142	5,565	90	82	3,929	5	2	0	—	—	—
1987	263	158	15,038	97	59	8,827	5	4	0	—	—	—
1988	191	124	6,354	127	77	6,146	6	6	68	—	—	—
1989	221	117	11,699	70	53	962	10	9	0	—	—	—
1990	245	172	10,158	71	63	4,022	7	0	0	—	—	—

-continued-

Table 8.–Page 2 of 2.

Year	CRAIG-KLAWOCK-HYDABURG Permits			SITKA Permits			KAH SHAKES Permits			Other Permits		
	Issued	Returned	Estimated Harvest [a]	Issued	Returned	Estimated Harvest [a]	Issued	Returned	Estimated Harvest *	Issued	Returned	Estimated Harvest [a]
1991	274	142	12,627	75	61	5,925	4	4	60	—	—	—
1992	407	304	16,677	118	90	7,151	8	7	75	—	—	—
1993	290	167	5,592	61	47	5,307	8	3	0	—	—	—
1994	293	161	5,376	81	63	3,078	9	6	0	—	—	—
1995	201	80	3,446	57	46	2,182	3	1	0	—	—	—
1996	261	164	11,443	100	76	6,000	4	3	0	—	—	—
1997	226	166	8,247	87	60	4,837	0	0	0	—	—	—
1998	213	88	5,670	60	42	3,079	0	0	0	—	—	—
1999	185	120	6,420	58	39	3,746	1	1	40	—	—	—
2000	116	77	820	47	46	2,759	0	0	0	—	—	—
2001	118	50	7,054	52	46	910	0	0	0	—	—	—
2002	111	35	7,164	47	41	4,111	1	0	0	—	—	—
2003	144	100	9,698	40	32	3,139	2	1	0	2 [b]	1	0
2004	95	57	5,685	52	36	10,412	6	5	0	7 [b]	6	0
2005	140	90	9,770	41	28	2,196	3	3	0	1 [b]	1	0
2006	92	82	6,074	32	31	3,399	0	0	0	0	0	0
2007	109	81	3,505	42	37	2,403	0	0	0	0	0	0
2008	117	57	7,043	41	39	1,741	0	0	0	0	0	0
2009	131	63	10,584	67	59	4,080	0	0	0	0	0	0
2010	102	51	7,288	60	55	5,784	0	0	0	0	0	0
2011	125	70	10,395	55	45	3,377	0	0	0	0	0	0
2012	85	67	3,663	61	50	2,532	0	0	0	1 [b]	1	0
2013	126	99	5,429	37	36	2,251	0	0	0	0	0	0
2014	116	76	5,057	42	29	2,842	0	0	0	2 [b]	2	10
2016	110	80	5,669	32	25	2,029	1	1	2	0	0	0
2017	73	40	2,651	36	21	2,611	0	0	0	0	0	0

[a] Total harvest extrapolated from harvests reported on returned permits to include an estimate of unreported harvests.

[b] West Behm Canal.

Table 9.–Southeast Alaska commercial herring fisheries total gross earnings (in thousands), 1977–2017, by calendar year. All values obtained from CFEC. Dashes indicate years when no fishery took place.

Year	Winter Bait	Seine Sac Roe	Gillnet Sac Roe	SOK – Southern	SOK – Northern	Total [c]
1977	$507	$695	—	—	—	$1,202
1978	—	$1,422	—	—	—	$1,422
1979	—	$9,052	—	—	—	$9,052
1980	—	$2,132	$312	—	—	$2,444
1981	$343	$2,376	$1,246	—	—	$3,965
1982	$558	$1,663	$602	—	—	$2,823
1983	$166	$5,032	$2,949	—	—	$8,147
1984	$128	$3,729	$2,327	—	—	$6,184
1985	$321	$7,883	$3,186	—	—	$11,390
1986	$548	$7,413	$2,636	—	—	$10,597
1987	$586	$4,396	$2,547	—	—	$7,529
1988	$1,010	$4,169	$3,108	—	—	$8,287
1989	$900	$1,182	$1,379	—	—	$3,461
1990	$1,030	$1,950	$260	—	$199	$3,439
1991	$916	$206	$624	—	$226	$1,972
1992	$720	$1,373	$1,777	—	$529	$4,399
1993	$471	$3,484	$1,300	—	$417	$5,672
1994	$125	$3,626	$1,768	—	$1,823	$7,342
1995	$147	$3,933	$1,864	$999	$1,476	$8,419
1996		$14,350	$1,665	$1,328	Confidential	$17,343
1997	$175	$4,726	$990	$282	$1,082	$7,255
1998	$526	$1,646	$613	$69	$169	$3,023
1999	$397	$4,906	$713	$374	$1,244	$7,634
2000	$236	$2,667	$226	—	$596	$3,725
2001	$131	$5,794	$254	$342	$1,017	$7,538
2002	$110	$4,441	$614	$352	$1,733	$7,250
2003	Confidential	$3,201	$784	$759	$2,288	$7,032
2004	Confidential	$5,162	$497	$653	$2,880	$9,192
2005	Confidential	$6,118	$408	$625	$1,566	$8,717
2006	Confidential	$2,645	$389	$289	$2,013	$5,336
2007	Confidential	$5,693	$570	$1,090	$4,491	$11,844
2008	$232	$10,732	$1,426	$3,493	$5,119	$21,002
2009	Confidential	$12,678	$1,064	$1,277	$2,890	$17,909
2010	Confidential	$12,146	$546	$756	$2,256	$15,704
2011	Confidential	$3,961	$64	$718	$1,814	$6,557
2012	Confidential	$8,865	$0	$2,013	$4,089	$14,967
2013[a]	Confidential	$4,436	$441	$4,924	$0	$9,801
2014[b]	Confidential	$3,145	Confidential	Confidential	Confidential	$9,417
2015	Confidential	$2,189	—	Confidential	$0	$2,189
2016[a]	Confidential	$1,563	—	Confidential	$0	$1,563
2017[b]	Confidential	$4,288	—	$933	$0	$5,221
Recent 10-year (2004–2013) Average						
	$232	$7,042	$545	$1,687	$2,693	$12,125
Recent 5-year (2009–2013) Average						
	—	$6,511	$263	$2,103	$2,040	$11,289

[a] Preliminary data from Commercial Fisheries Entry Commission (CFEC).

[b] Preliminary ADF&G estimates based on fish tickets.

[c] Confidential data not included in totals, except for 2014.

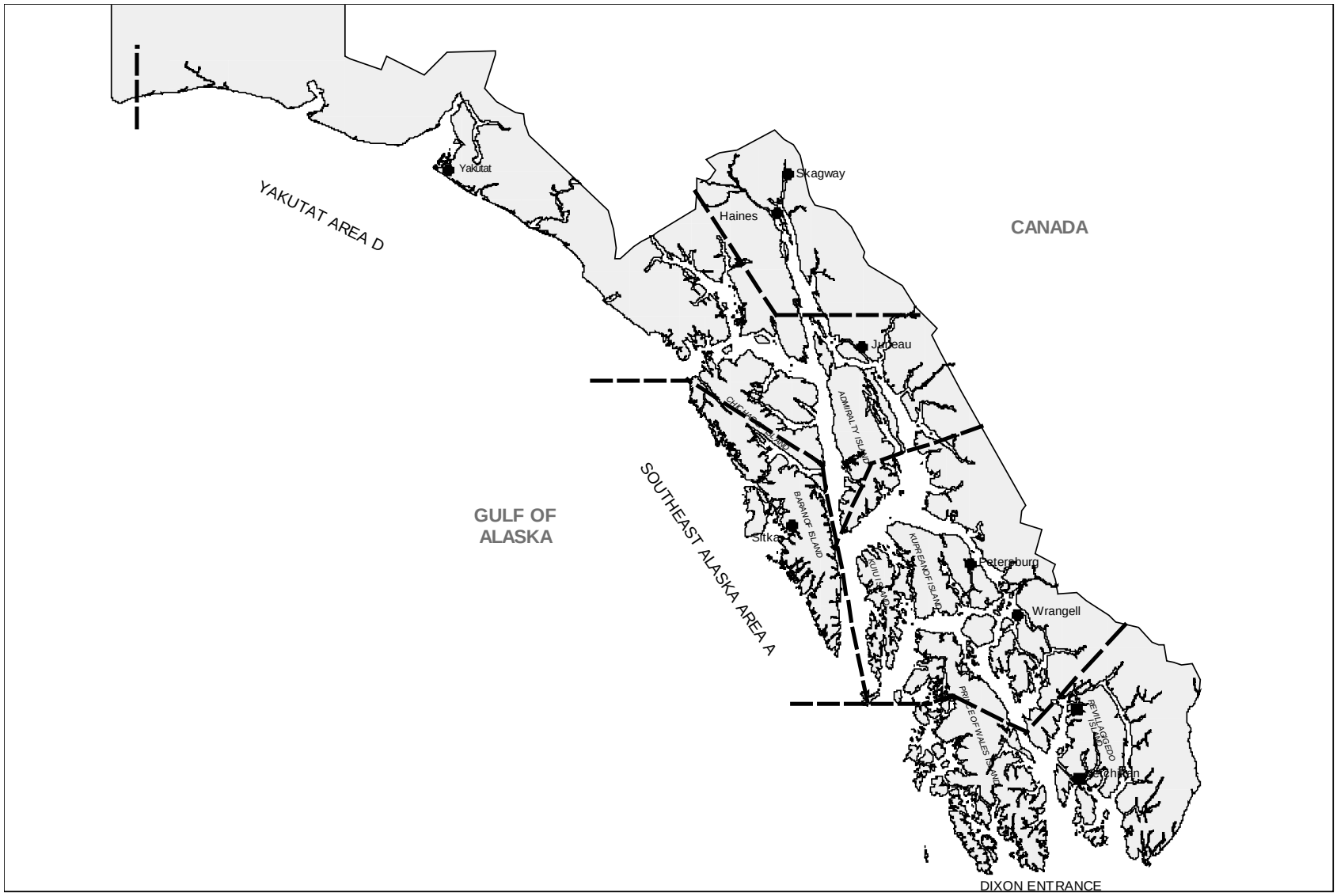

Figure 1.–Southeast Alaska Region (Region 1) herring registration areas (Southeast Alaska Area A and Yakutat Area D) and management area boundaries.

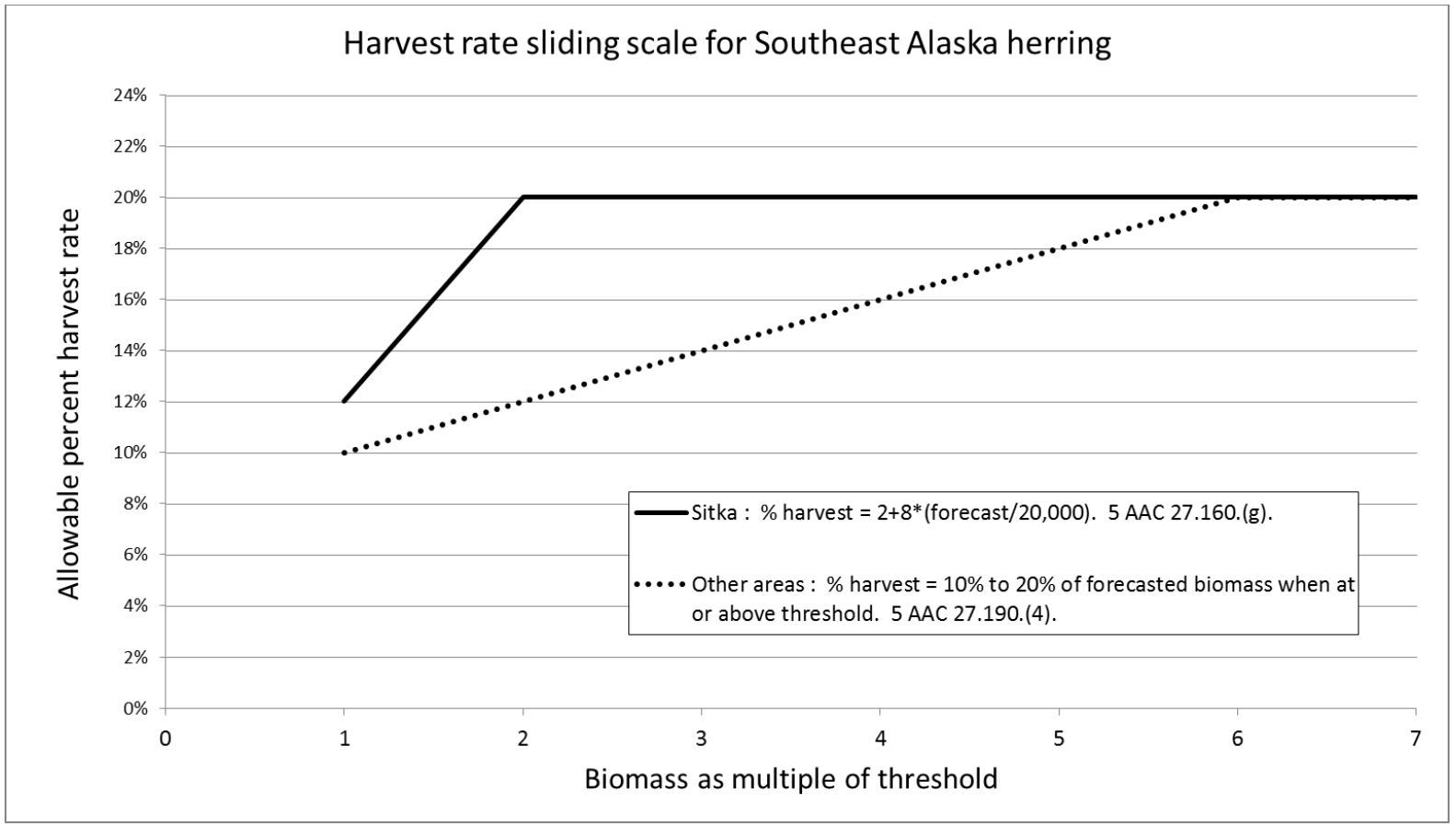

Figure 2.–Generalized harvest strategy for Southeast Alaska and Yakutat herring showing allowable percent annual exploitation rate as related to estimated biomass of mature herring, expressed as a multiple of the threshold level. No fishery occurs if below threshold and the maximum harvest rate is 20%.

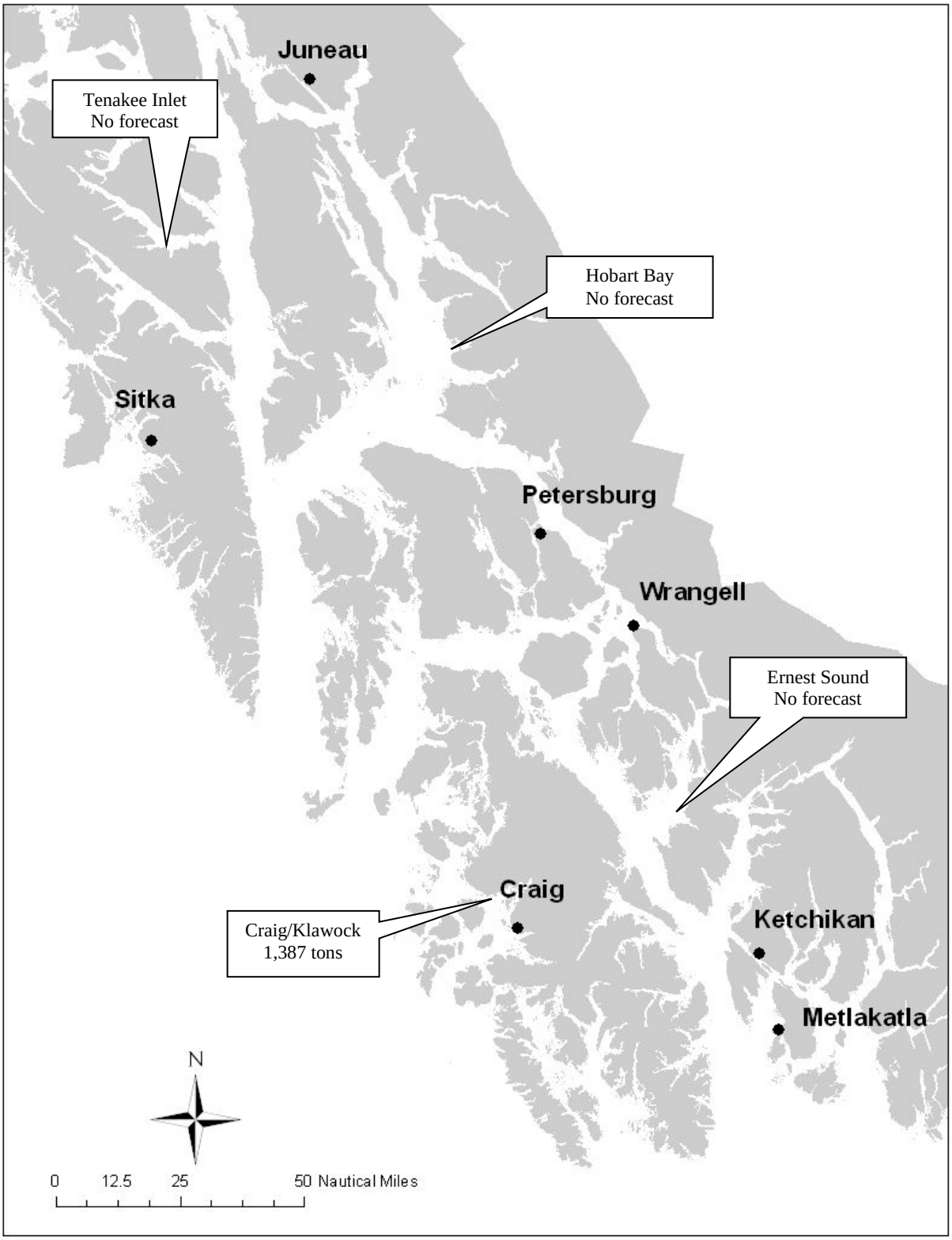

Figure 3.–Food and bait fishing areas and guideline harvest levels, 2017/18 season.

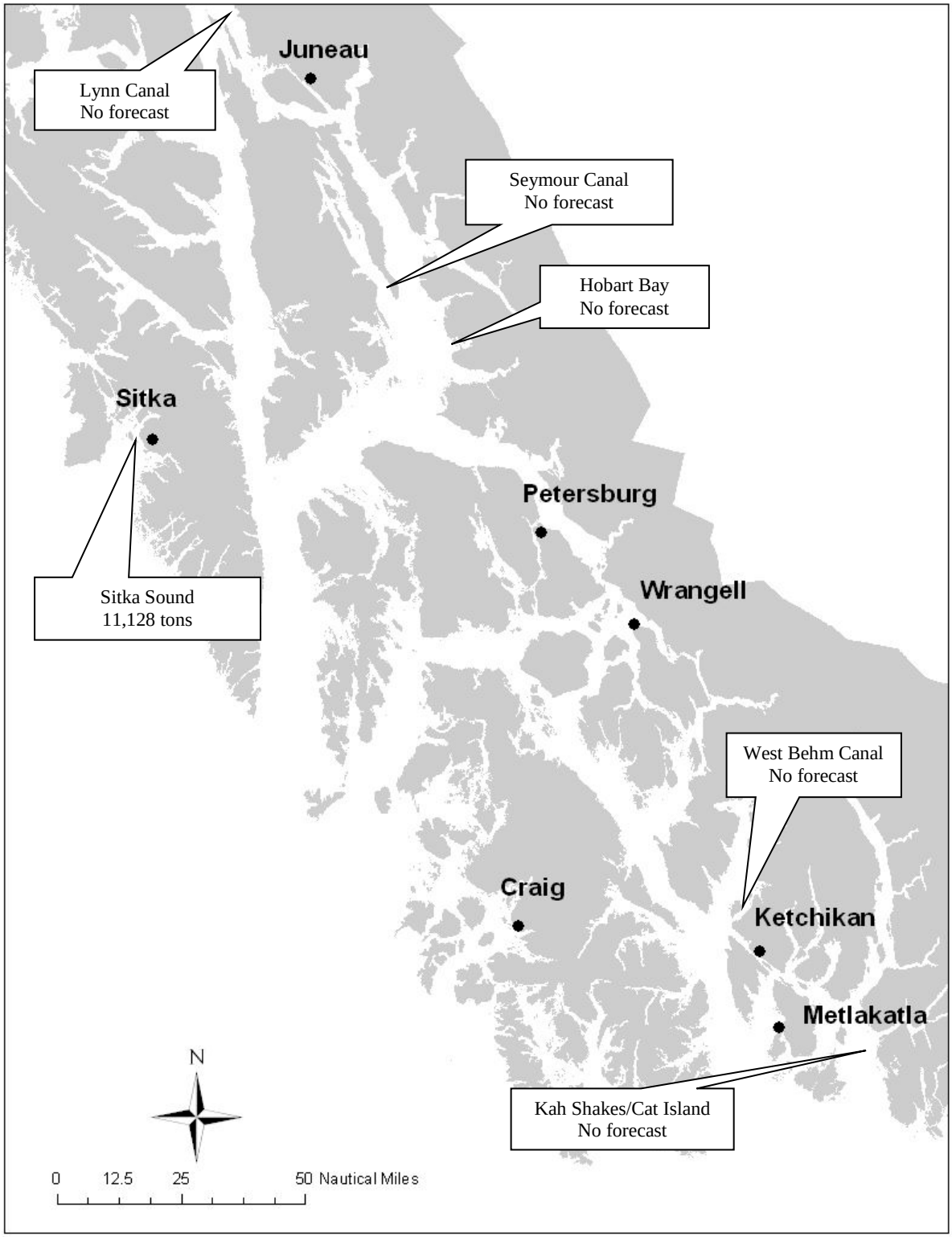

Figure 4.–Sac-roe fishing areas and guideline harvest levels, 2017/18 season.

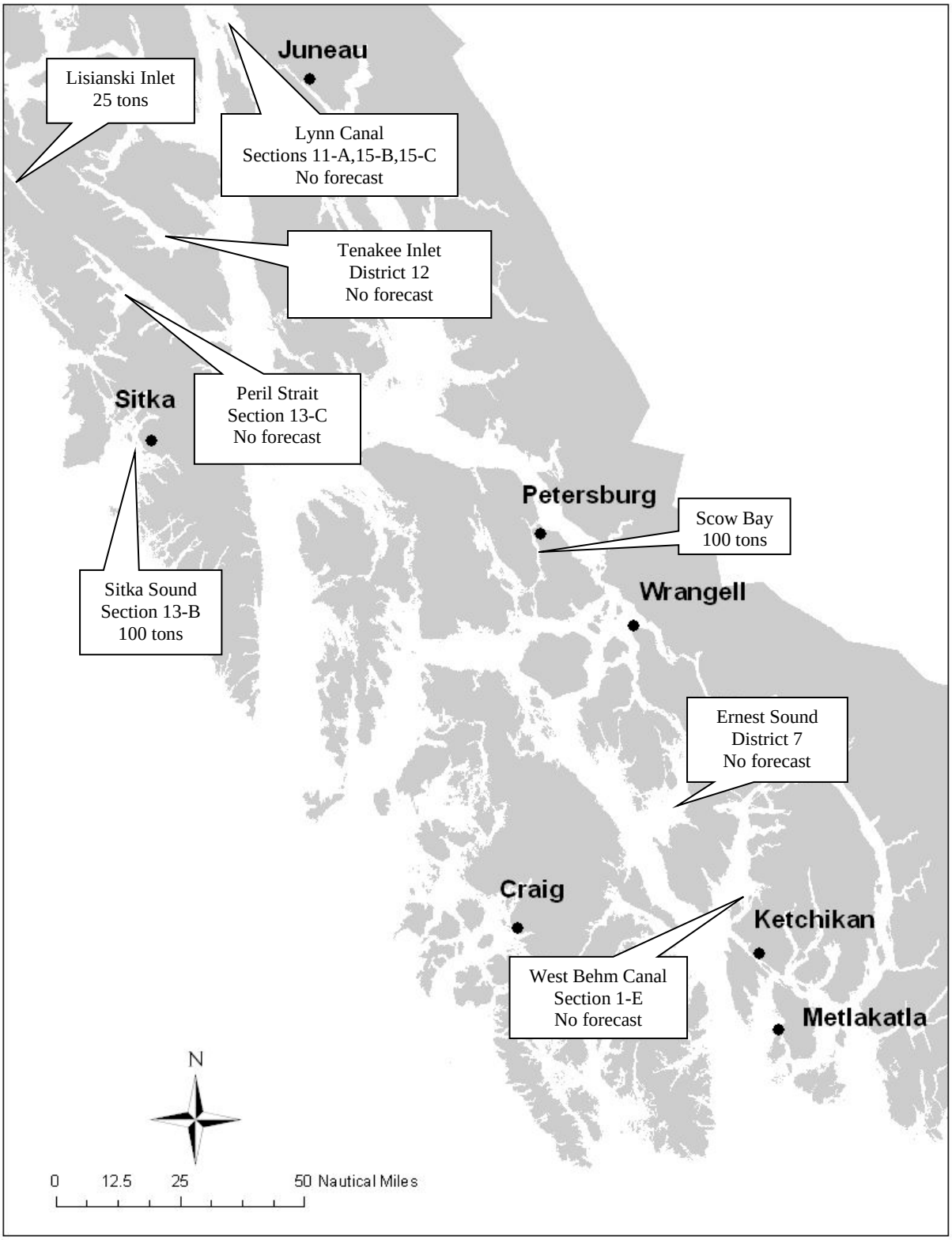

Figure 5.–Fresh bait pound fishing areas and GHLs for the 2017/18 season.

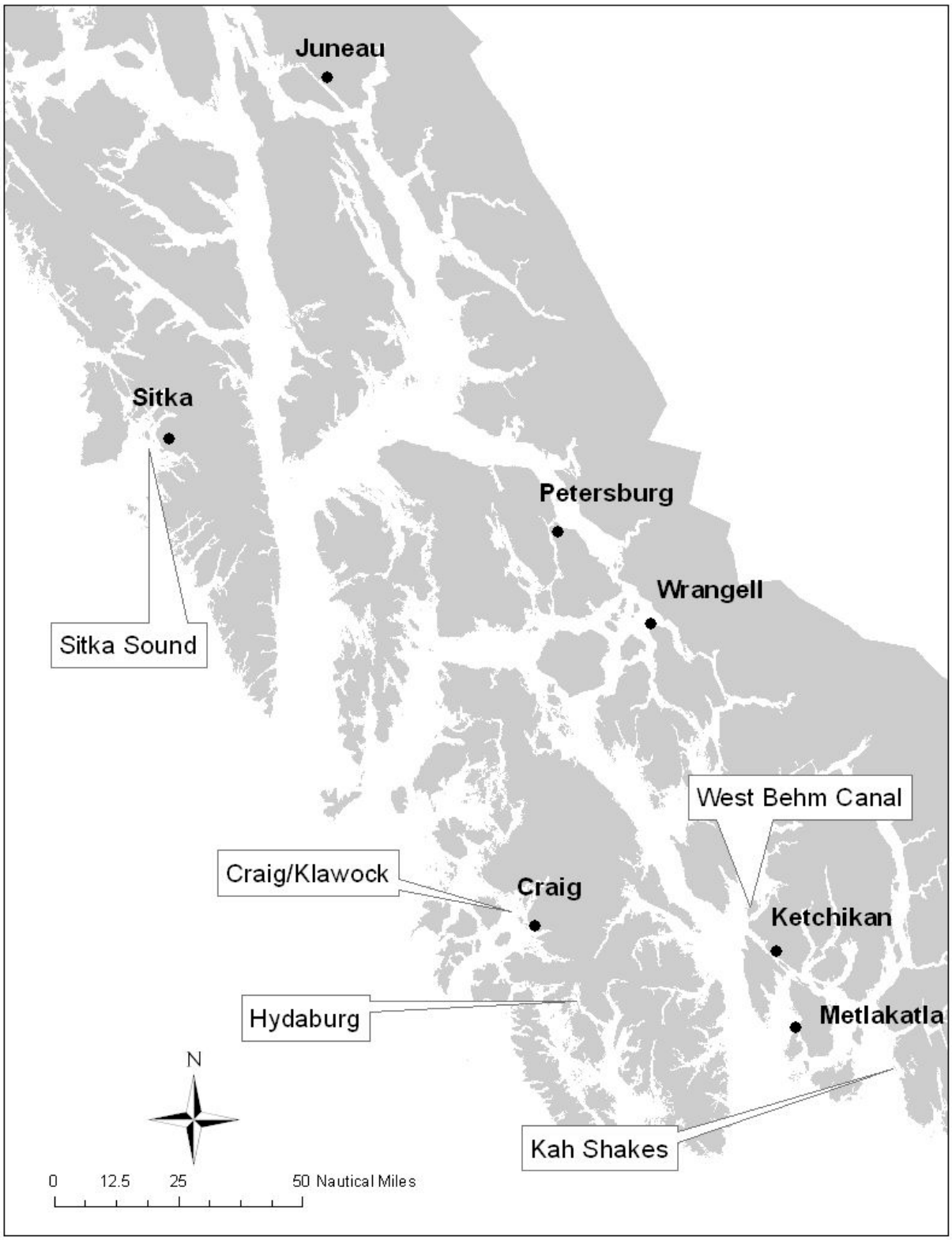

Figure 6.–Major Southeast Alaska spawn-on-kelp subsistence fishery areas.

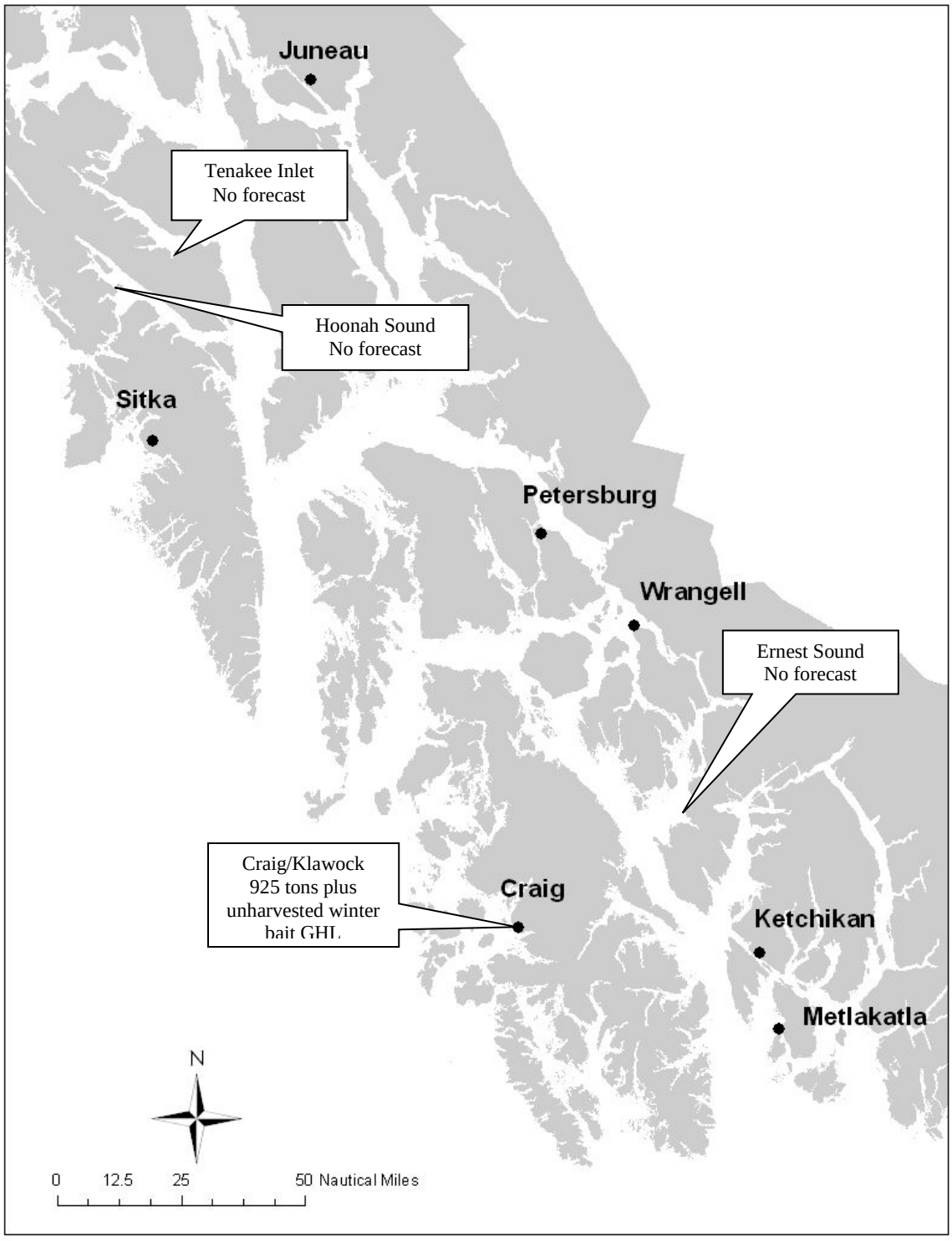

Figure 7.–Spawn-on-kelp fishing areas and guideline harvest levels (tons of herring), 2017/18 season.

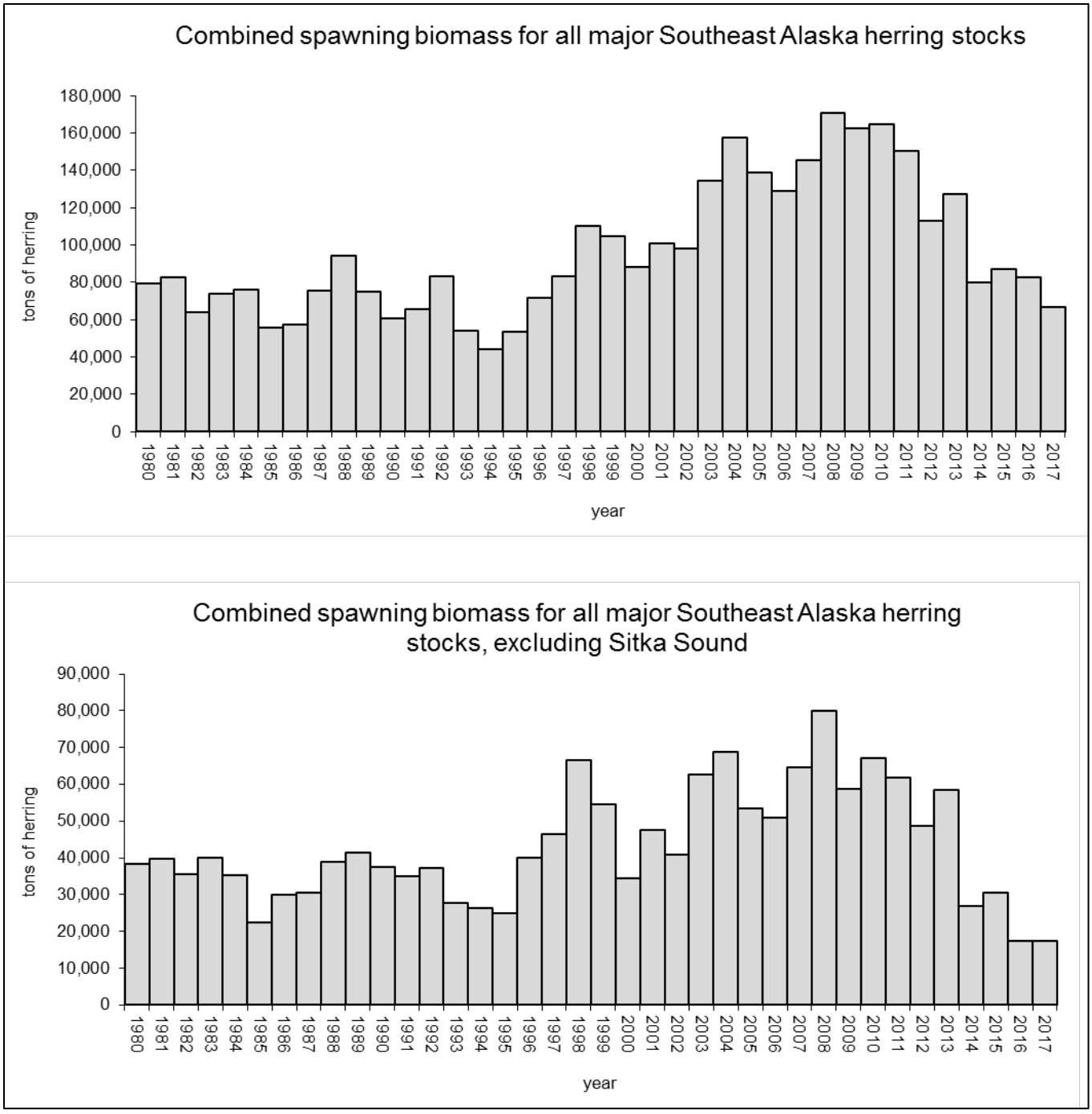

Figure 8.–Estimates of combined spawning biomass for all spawning areas in Southeast Alaska (top graph) and all areas except Sitka Sound (bottom graph). Estimates were calculated using an ASA-model for Sitka and Craig areas, and spawn deposition methods for all other stocks. Estimates for 2016 represent only six of ten spawning areas, and estimates for 2017 represent only three of ten spawning areas, because surveys were not conducted in some areas due to lack of funding.